
Environmental Statistics ♦ December 2008

The Heat is On: Energy Use and Household Heating in B.C.

With higher energy costs, enhanced interest in environmental impact and the ratification of policies and protocols like Kyoto, many British Columbians have a renewed awareness in the environmental impact of energy consumption in their households.

Between 1990 and 2005, energy use in Canada increased by nearly 22% and, as a result, Canada's total greenhouse gas (GHG) emissions increased by approximately the same amount. At the end of 2006, the nation's GHG target emissions stood around 29% above the Kyoto goal.

In sharp contrast to Canada's overall discouraging performance in energy efficiency and curbing of GHG emissions, in the nation's residential sector, GHG emissions dropped by nearly nine percent (-8.5%), despite a 28% surge in the number of households over the same period. This translates to an average decline of 15% in energy use per home between 1990 and 2005.

Regionally, GHG emissions from energy consumed in homes varied widely, but fell in all provinces on a per household basis. The number of households in British Columbia has soared in recent years, climbing 37% between 1990 and 2005 to reach nearly 1,700,000. Despite the growth in number of residences, the total amount of energy consumed by households in the province increased at a much slower rate (+19%) over the same fifteen years. As a result,

the energy intensity¹ of BC households improved by ten percent over the period, a somewhat more significant advance than for the nation as a whole (-8.5%).

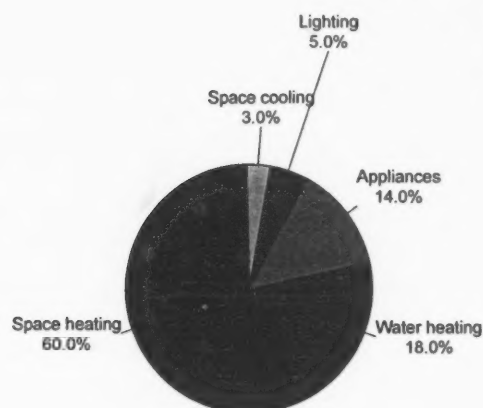
The impact of the long-term trend of improved energy standards for homes and the adoption of higher efficiency furnaces and other improved appliances has served to reduce emissions.² Households use energy for various activities: space heating comprises most residential energy use, followed by water heating, appliances and lighting. With the cold season in our midst, on average, 50% of British Columbians' monthly energy bill is dedicated to home heating.³ Heating our living spaces is a highly visible use of energy to which most Canadians are accustomed and as with all activities involving energy use, the heating and cooling of our homes have consequences for our environment.

¹ Natural Resources Canada (NRC) defines energy intensity as representing the amount of energy use per unit of activity. It reflects the relative change in the average amount of energy used in a household, whereby a negative intensity value indicates higher energy efficiency (i.e. less energy was used to do the same things). A negative score is an improved score.

² *Energy Use and Greenhouse Gas Emission Performance: 1990 to 2005*. Canadian Home Builders' Association, September 17, 2008.

³ Recycling Council of BC

Share of residential energy use, 2005



Data Source: Natural Resources Canada

Thermostats regulate home heating

British Columbia is a province of diverse climate extremes with varying heating requirements. Nonetheless, heating the home accounts for a large portion of total expenses for British Columbians in all regions of the province. In 2006, BC households spent an average of \$1,650 on electricity, natural gas, and other fuel for heating and cooking in the primary residence. This was significantly higher (+7.8%) than just two years prior in 2004, when fuel costs took an average bite of \$1,531 out of the annual household budget.⁴

With the increasing cost of energy, householders are naturally conscious of the energy they consume and, as a result—coupled with an increased environmental awareness—many are making an effort to conserve energy. Many en-

ergy-conscious households install devices such as energy-saving light bulbs and appliances to help curb energy usage and cost. In the winter months, houses with thermostats tend to conserve the most energy when it comes to heating, and of those, programmable thermostats, which automatically adjust the temperature setting according to the time of day, make it easiest to maintain and regulate the amount of energy used to heat a home.

Programmable thermostats have become increasingly popular among British Columbians and Canadians alike. Since the development of the R-2000 Initiative⁵ in the early 1980s, building practices have been evolving in terms of building materials, and different standards for housing components that are more energy efficient.⁶ This has had a notable impact on both new and existing homes and additions of technologies such as programmable thermostats have allowed the residential sector to become a leader in the reduction of GHG emissions.

In 1994, 15% of thermostats in BC households were programmable; by 2006, this percentage had grown to 36%. With higher numbers seen in every province, the Canadian average also grew significantly over the same period, with increases ranging from 10 percentage points in Nova Scotia (from 9% in 1994 to 19% in 2006) to 26 percentage points in Alberta, Saskatchewan and Ontario (reaching 41%, 36% and 50%, re-

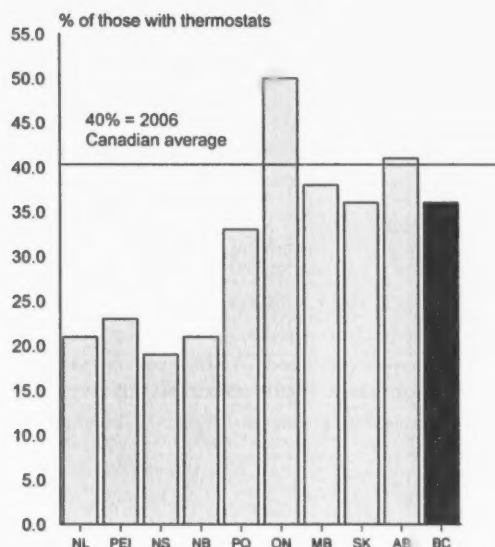
⁵ R-2000 is an initiative developed by Natural Resources Canada, in partnership with Canada's residential construction industry, with the aim of promoting the use of cost-effective, energy-efficient building practices and technologies with rigorous energy consumption targets. For more information on R-2000 and other such initiatives, see the Natural Resources Canada website: www.oeenrncan.gc.ca

⁶ *The Energy and Greenhouse Gas Performance of Canada's Residential Sector, 1990 to 2005*. Canadian Home Builders' Association. July 22, 2008.

⁴ Statistics Canada. *Survey of Household Spending, 2006*.

spectively, in 2006). Overall, 40% of Canadian households had a programmable thermostat in 2006, an increase of 24 percentage points over the 1994 figure. Households in Ontario were the most likely to have one of these devices in 2006 (50% of all houses with a thermostat had a programmable one), while with ownership under 25% in all four provinces, Atlantic Canada was the least likely.

Households equipped with programmable thermostats by province, 2006 (%)



Data Source: Statistics Canada

Among BC's Census Metropolitan Areas (CMAs), these mechanisms were significantly more common in residences in Vancouver (37%) and Abbotsford (36%) than in the province's capital city (28%) in 2006.

Making use of the technologies

Of course, to realize its full energy-saving potential a programmable thermostat must be put to use. However, in 2006, of the BC households that had one such device, 18% did not program it. This was the case most frequently in Victoria,

where nearly a quarter (22%) of households did not program their programmable thermostat.

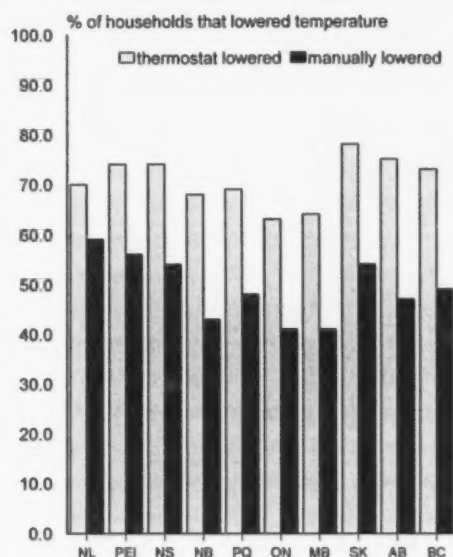
Lowering one's household temperature at some point during the day can have a significant effect on energy use in the home. Lowering a thermostat by just one degree can cut as much as 10% off a residential heating bill.⁷ By easing system use when dwellings are unoccupied or when the occupants are asleep, energy consumption is reduced. Not surprisingly, the most common time for most households to lower the temperature is at night, regardless of whether or not they have a programmable thermostat.

However, this process is facilitated for those whose thermostats are programmable and this is reflected in the likelihood of households to lower the temperature in their homes while they sleep. For example, of households that programmed their programmable thermostats in 2006, 73% lowered the temperature while they slept, but only 49% of householders manually lowered the temperature at night (including those who owned a nonprogrammable thermostat or who did not program their programmable device). Programmable thermostats facilitate energy conservation and money saving by optimizing the operation of heating systems. This is reflected in the higher likelihood of households equipped with and using these mechanisms to lower temperatures compared to those who have to remember to do so manually.

⁷ Natural Resources Canada in conjunction with BC Hydro:

www.oeenrncan.gc.ca/residential/personal/new-home-improvement/home-energy-saving-tips.cfm

Households with programmed thermostats are more likely to lower temperature at night, 2006



Data Source: Statistics Canada

Individual choice is also a notable factor in determining whether or not to lower temperatures in one's household and, not surprisingly, certain people are more likely than others to do so. Seniors are among those most prone to lowering temperatures in Canada, despite that fact that senior-only homes are the least likely to have a programmable thermostat. The likelihood of thermostats being lowered at night is also higher among households where one or more residents have a post-secondary education. High-income households were far more likely to turn down the heat than were renters, partly the result of there being more programmable thermostats in higher income dwellings than in lower income homes.⁸ Tenants are also less likely to turn down the heat, perhaps because it is often the case that renters do not directly pay for heating costs in their homes.

⁸ For more detail and data on household thermostat use in Canada, see, *Controlling the Temperature in Canadian Homes*. Statistics Canada, September, 2008.

Types of fuel used for heating

Another important factor associated with the quantity of greenhouse gas (GHG) emissions produced by households is the type of energy used to heat them. In other words, the quantity of emissions is not only dependent upon the number of homes heated, or the temperature at which they are kept, but also upon the type of energy used.

Some energy sources used for home heating are more GHG friendly than others. For example, natural gas and electricity (specifically electricity produced with low emission technologies such as hydroelectricity) produce fewer emissions than oil.⁹ This offers potential for balancing or even offsetting some negative environmental effects, if an increase in the number of households is accompanied by simultaneous changes in favour of lower-carbon energy sources.

Given the considerable growth in the number of homes in BC between 1990 and 2005, it is somewhat surprising that residential emissions have not risen accordingly. Without changes in the sources of energy used to heat the houses, the outcome could very well have been much different. Indeed, if households in 2005 were still using the same type of energy sources used in 1990 and in the same proportions, the quantity of GHG emissions produced by the residential sector would no doubt have been far greater.¹⁰

⁹ Statistics Canada. *Canadian Social Trends*. Spring, 2006.

¹⁰ Environment Canada. Data available at www.ec.gc.ca

Geography plays a role in choice of fuel source

Among the nation's regions, the mix of energy sources, distribution networks and local prices play a large role in determining how residents heat their homes.

In BC, hydroelectricity is abundant and, as such, it is an important source of energy for heating households in the province. Since natural gas pipelines are even more prevalent in parts of BC, most British Columbian homes (59% in 2006) rely on piped gas (natural gas) for heat. Still, nearly a third (32%) of residences in the province use electricity as their primary fuel source for heat, a much higher ratio than for many other provinces. A further eight percent use oil or wood as a main energy source for heat.

By comparison, and not surprisingly, homes in Alberta are almost all (91% in 2006) heated with piped gas (natural gas), while only four percent rely on electricity.

In Quebec, where electricity rates are among the lowest in Canada, more than three quarters (76%) of households use electricity to heat their homes, a usage rate much higher than the national average (56%). Meanwhile, Ontarians utilize natural gas as their principal energy source for heating (71%).

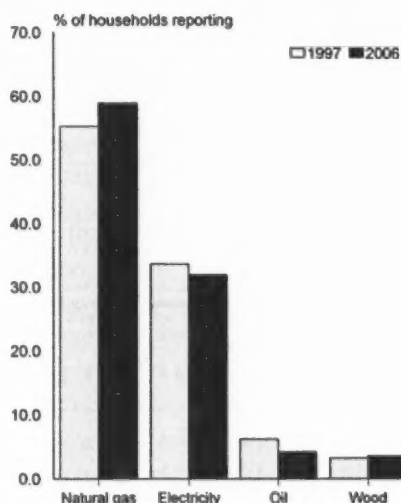
The picture is equally as diverse in the Atlantic provinces. Over half of all households in New Brunswick and Newfoundland and Labrador rely on electricity as their leading source, while in neighbouring Nova Scotia and PEI, oil heats most homes. Virtually no homes are heated with piped gas in Atlantic Canada, where natural gas has only been on the market since

2004.¹¹ Unlike the rest of the country, wood remains a popular heating alternative in the Maritimes. In Newfoundland and Labrador, as many as nearly one in five households use wood as a primary heating source.

Not surprisingly, there are also some marked differences among cities within provinces and BC is no exception. The province's two largest metropolitan cities differ significantly in fuel choice: in 2006, Victorians tend to turn to electricity (67%) to heat their homes, while Vancouverites rely most heavily on natural gas (72%).

Patterns in fuel source have changed slightly over the past ten years in the province, but continue to reflect accessibility of the province's resources. Oil continues to lose popularity as a principle fuel source, while natural gas is becoming more commonplace.

Principal home heating fuel in BC, 1997 and 2006



Data Source: Statistics Canada, Survey of Household Spending

¹¹ Natural gas pipelines are new to the Atlantic provinces and the distribution network is consequently not yet very extensive

Social Components

Geography is not the only determining factor that comes into play in terms of fuel usage for home heating; there are also social dimensions. For instance, in general, apartment buildings are more likely to be heated with electricity, compared to houses (single-detached, semi-detached, row houses and other types of single-attached houses). Much of this is attributable to the fact that most apartment dwellers are renters. Electric heat is easier to meter individually, requires less maintenance and, as a result, has advantages for landlords. Oil is used by a minority of both house and apartment dwelling types¹² Since the majority of apartment residents are renters¹³ tenants are far more likely than homeowners to use electricity. On the other hand, most houses are owner-occupied and owners more often heat their own homes with natural gas than electricity.

Household income is also an important social factor to consider. Compared to those in the highest income quintile, significantly more households in the lowest income quintile rent their homes. It follows that sources of home heating vary significantly across income groups.

Social characteristics such as dwelling types can also be unique to certain regions and, as such, can potentially be linked to heating patterns. For example, Quebec has the highest proportion of apartment dwellings in the country (46% in 2006, compared to 32% nationwide) and the fact that electric heating is most commonly used in such buildings is another factor contributing to that province's higher

usage rate of electricity for heating households.¹⁴

Looking Ahead

Despite a boom in the number of households in BC over the past fifteen reporting years, improved efficiencies have allowed for greenhouse gas emissions to remain at bay in the residential sector over the last decade. Since the nation's residential sector accounts for such a small share of Canada's GHG emissions (about eight percent in 2005), and although there remains ample room for improvement, it would seem that home heating and energy use may not be the first avenue to look to for major provincial or national reductions in GHG emissions. The transportation (33% of emissions from 1990 to 2005) and commercial/institutional (33%) sectors are by far the largest contributors to GHG emissions in the country.¹⁵ That being said, the impact of the residential sector could have been much greater if the methods used to heat homes had not changed. The quantity of greenhouse gas emissions attributed to the residential sector in 2005 reflects the increase in the number of households, improvements in energy efficiency and heating technologies, and the changes in the types of energy used.

Canadians have long taken advantage of geography to generate electricity from water. Indeed, hydroelectricity is our leading renewable energy source. It follows that further adaptation to changing needs and growing demand for energy are imperative in the effort to reduce the country's carbon footprint. Canadian residents, businesses, industries and

¹² Statistics Canada. Catalogue # 11-008. Available at www.statcan.gc.ca

¹³ Statistics Canada. 2006 Census.

¹⁴ Statistics Canada. *Survey of Household Spending*, 2006.

¹⁵ Natural Resources Canada in conjunction with the Canadian Home Builders' Association, 2008.

governments alike are investing in new sources of renewable energy. Currently, Canada's fastest-growing renewable energy sources are tidal energy and wind. Such sources are abundant and generally perceived as clean as well as being relatively economical to produce where climate and geographical conditions allow.¹⁶

Private households in British Columbia and across the country appear to be well situated to face the energy-related environmental challenges that are present now and those that will inevitably present themselves in the future.

¹⁶ Statistics Canada, *Energy Overview*, 2007

Table 1

Dwelling temperature changes in households with a programmable thermostat, by province and selected CMAs, 2006

	Households with programmable thermostat ¹	Households that programmed their thermostat ²	Thermostat automatically lowered temperature ³			
			Lowered temperature	Lowered temperature by 3 or more degrees	Lowered temperature by 1 or 2 degrees	Did not lower temperature
Canada	40	83	68	35	33	32
Newfoundland & Labrador	21	79	70	50	20	30
Prince Edward Island	23	83	74	44	30	26
Nova Scotia	19	80	74	43	31	26
New Brunswick	21	73	68	45	24	32
Quebec	33	81	69	38	30	31
Ontario	50	85	63	27	36	37
Manitoba	38	78	64	29	35	36
Saskatchewan	36	85	78	42	36	22
Alberta	41	85	75	42	34	25
British Columbia	36	82	73	45	27	27
Abbotsford	36	82	66	33	32	34
Vancouver	37	82	72	46	26	28
Victoria	28	78	73	48	25	27

Notes:

1. As a percentage of all households

2. As a percentage of all households with a thermostat

3. During the heating season; as a percentage of those households that reported having a programmable thermostat in 2006 and programmed it

Data Source: Statistics Canada, Household and the Environment Survey, 2006

Table 2

Dwelling temperature changes in households with an unprogrammed or non-programmable thermostat, by province and selected CMAs, 2006

	Households with unprogrammed or non-programmable thermostat ¹	Someone manually lowered the temperature			Did not lower temperature
		Lowered temperature	Lowered temperature by 3 or more degrees	Lowered temperature by 1 or 2 degrees	
Canada	67	46	24	22	54
Newfoundland & Labrador	83	59	44	15	41
Prince Edward Island	81	56	35	20	44
Nova Scotia	84	54	33	21	46
New Brunswick	84	43	26	17	57
Quebec	73	48	22	25	52
Ontario	57	41	19	21	59
Manitoba	70	41	19	22	59
Saskatchewan	70	54	30	24	46
Alberta	64	47	25	22	53
British Columbia	70	49	32	17	51
Abbotsford	70	56	40	16	44
Vancouver	70	44	29	15	56
Victoria	78	51	34	17	49

Notes:

1 As a percentage of all households

Data Source: Statistics Canada, Household and the Environment Survey, 2006

Table 3

Percentage of households with programmable thermostats, by province and selected CMAs, 2006

	Households with a thermostat (%)		
	Any thermostat ¹	Programmable thermostat ²	Programmed thermostat ³
Canada	90	40	83
Newfoundland and Labrador	92	21	79
Prince Edward Island	97	23	83
Nova Scotia	96	19	80
New Brunswick	94	21	73
Quebec	90	33	81
Ontario	86	50	85
Manitoba	94	38	78
Saskatchewan	95	36	85
Alberta	96	41	85
British Columbia	89	36	82
Abbotsford	92	36	82
Vancouver	87	37	82
Victoria	91	28	78

Notes:

1 As a percentage of all households

2 As a percentage of all households with a thermostat

3 As a percentage of all households with a programmable thermostat

Data Source: Statistics Canada, Household and the Environment Survey, 2006

Table 4
Dwelling characteristics by province, 2006 (% of total dwellings)

	Single-detached house	Single-attached house	Apartment
Canada	57	10	32
Newfoundland and Labrador	76	10	13
Prince Edward Island	71	7	17
Nova Scotia	66	6	23
New Brunswick	75	5	16
Quebec	46	7	46
Ontario	57	14	29
Manitoba	68	4	25
Saskatchewan	74	5	19
Alberta	64	11	21
British Columbia	56	10	29

Data Source: Statistics Canada, Survey of Household Spending, 2006

Table 5
Principle heating source by province and selected Census Metropolitan Areas, 2006 (%)

	Principle source of heating (%)					
	Oil or other liquid fuel	Piped gas (natural gas)	Bottled gas (propane)	Electricity	Wood	Other heating fuel
Canada	9.5	49.4	1.0	34.8	4.7	0.6
Newfoundland and Labrador	28.7	n/a	n/a	55.8	15.1	n/a
Prince Edward Island	80.4	n/a	n/a	n/a	13.7	n/a
Nova Scotia	59.9	n/a	n/a	25.2	12.8	n/a
New Brunswick	19.8	n/a	2.8	58.6	18.7	n/a
Quebec	10.8	5.3	n/a	76.1	7.2	n/a
Ontario	7.6	71.0	n/a	16.7	2.8	n/a
Manitoba	n/a	58.5	n/a	34.8	3.2	n/a
Saskatchewan	3.2	86.3	n/a	5.2	2.3	n/a
Alberta	n/a	91.0	n/a	4.0	n/a	n/a
British Columbia	4.2	58.9	n/a	31.9	3.5	n/a
Vancouver	n/a	71.7	n/a	26.6	n/a	n/a
Victoria	n/a	n/a	n/a	67.4	n/a	n/a

Notes:

n/a: data not available and/or too small and unreliable to publish

Data Source: Statistics Canada, Census 2006